

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : **David D. Needelman et al.**
Serial No. : **10/709,348** **Group Art Unit: 3661**
Filed : **April 29, 2004** **Examiner: Yonel Beaulieu**
For: **MULTIPLE STAYOUT ZONES FOR GROUND-BASED
BRIGHT OBJECT EXCLUSION**

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The following is in response to the office action dated June 21, 2006. Kindly enter the following amendment.

Amendment to the Claims begins on page 2.

Remarks begin on page 9.

IN THE CLAIMS

1. (currently amended) A method of operating a star tracker comprising:
in a ground station, determining multiple stayout zones for an object;
in said ground station, selecting a first stayout zone from said multiple stayout zones;
determining a star in said first stayout zone; and
determining a vehicle inertial attitude or angular velocity, based on star measurements of sensed or tracked stars, excluding said star within said first stayout zone,
wherein excluding the star is dependent on properties of the star and properties of the object.

2. (original) A method as recited in claim 1 wherein determining multiple stayout zones comprises calculating at least one circular stayout zone.

3. (original) A method as recited in claim 1 wherein determining multiple stayout zones comprises calculating at least one non-circular stayout zone.

4. (currently amended) A method as recited in claim 1 wherein determining multiple stayout zones comprises calculating at least one ~~non~~-circular stayout zone and one non-circular stayout zone.

5. (original) A method as recited in claim 1 wherein excluding the star is performed for a fixed period of time.

6. (original) A method as recited in claim 1 wherein excluding the star is performed for a non-fixed period of time.

7. (canceled)

8. (currently amended) A method as recited in ~~claim 7~~ claim 1, wherein the property is brightness.

9. (original) A method as recited in claim 1 wherein further comprising controlling vehicle attitude or angular velocity, in response to the vehicle inertial attitude or angular velocity.

10. (original) A method as recited in claim 1 wherein excluding the star is performed on-board the vehicle.

11. (original) A method as recited in claim 1 wherein selecting comprises when a star is within the first exclusion zone, excluding the star,
when the star is in a second exclusion zone of the multiple exclusion zones,
excluding the star when the brightness is below a first magnitude.

12. (original) A method as recited in claim 11 wherein the first exclusion zone has a different shape than the second exclusion zone.

13. (original) A method as recited in claim 11 further comprising when the star is in a third exclusion zone of the multiple exclusion zones, excluding the star when the brightness is below a second magnitude, different than the first magnitude.

14. (original) A method as recited in claim 13 wherein the third exclusion zone has a different shape than the first exclusion zone or the second exclusion zone.

15. (currently amended) A method of determining a vehicle inertial attitude or angular velocity, comprising:

in a ground station, calculating multiple stayout zones associated with at least one object;

in said ground station, selecting at least one stayout zone from said multiple stayout zones;

calculating at least one star inside said at least one stayout zone intruded by said at least one object therein;

listing said at least one star inside said at least one stayout zone in an exclusion list;

flagging star catalog or database entries, corresponding to said at least one star listed on said exclusion list, as excluded from consideration by an attitude determination algorithm and procedure or a angular velocity determination algorithm and procedure; and

determining a vehicle inertial attitude or angular velocity, in response to data including star position measurements and said star catalog,

wherein excluding said at least one star is dependent on properties of the star and properties of the object.

16. (original) A method as recited in claim 15 wherein determining multiple stayout zones comprises calculating at least one circular stayout zone.

17. (original) A method as recited in claim 15 wherein determining multiple stayout zones comprises calculating at least one non-circular stayout zone.

18. (currently amended) A method as recited in claim 15 wherein determining multiple stayout zones comprises calculating at least one ~~non-circular~~ circular stayout zone and one non-circular stayout zone.

19. (original) A method as recited in claim 15 wherein excluding the star is performed for a fixed period of time.

20. (original) A method as recited in claim 15 wherein excluding the star is performed for a non-fixed period of time.

21. (canceled)

22. (currently amended) A method as recited in claim 15 ~~claim 21~~ wherein the property is brightness.

23. (original) A method as recited in claim 15 wherein further comprising controlling vehicle attitude or angular velocity, in response to the vehicle inertial attitude or angular velocity.

24. (original) A method as recited in claim 15 wherein excluding the star is performed on-board the vehicle.

25. (original) A method as recited in claim 15 wherein selecting comprises when a star is within the first exclusion zone, excluding the star, when the star is in a second exclusion zone of the multiple exclusion zones, excluding the star when the brightness is below a first magnitude.

26. (original) A method as recited in claim 25 wherein the first exclusion zone has a different shape than the second exclusion zone.

27. (original) A method as recited in claim 25 further comprising when the star is in a third exclusion zone of the multiple exclusion zones, excluding the star when the brightness is below a second magnitude, different than the first magnitude.

28. (original) A method as recited in claim 27 wherein the third exclusion zone has a different shape than the first exclusion zone or the second exclusion zone.

29. (currently amended) A system comprising:

a vehicle comprising,

an attitude control system or angular velocity control system;

a star tracker having field of view; and

a ground station comprising,

a star catalog memory having a star catalog stored therein said star catalog having a plurality of entries, each entry having an associated flag therewith;

an exclusion list memory; and

a processor coupled to said attitude or angular velocity control system and said star catalog, said exclusion list memory, said processor determining multiple stayout zones for at least one object, selecting a stayout zone from said multiple stayout zones, determining a subset of said at least one object in said stayout zone, excluding at least one object from said subset of said at least one object from said field of view within said stayout zone to form a revised database, star catalog, or star sub-catalog, determining a vehicle inertial attitude, angular velocity, relative star sensor or tracker alignment estimate, in response to said revised database, star catalog, or star sub-catalog and controlling said attitude control system or angular velocity system in response to said revised database, star catalog, or star sub-catalog,

wherein excluding the star is dependent on properties of the star and properties of the object.

30. (original) A system as recited in claim 29 wherein the vehicle comprises a spacecraft.
31. (original) A system as recited in claim 29 wherein said multiple stayout zones comprises calculating at least one circular stayout zone.
32. (original) A system as recited in claim 29 wherein said multiple stayout zones comprises calculating at least one non-circular stayout zone.
33. (original) A system as recited in claim 29 wherein said multiple stayout zones comprises calculating at least one circular rectangular stayout zone.
34. (original) A system as recited in claim 29 wherein said multiple stayout zones comprises calculating at least one circular stayout zone and one non-circular stayout zone.
35. (canceled)
36. (currently amended) A system as recited in claim 29 ~~claim 35~~ wherein the properties of the star and properties of the object comprise brightness.
37. (original) A system as recited in claim 29 wherein selecting comprises when a star is within the first exclusion zone, said processor excluding the star, when the star is in a second exclusion zone of the multiple exclusion zones, said processor excluding the star when the brightness is below a first magnitude.
38. (original) A system as recited in claim 37 wherein the first exclusion zone has a different shape than the second exclusion zone.

39. (original) A system as recited in claim 37 further comprising when the star is in a third exclusion zone of the multiple exclusion zones, said processor excluding the star when the brightness is below a second magnitude, different than the first magnitude.

40. (original) A system as recited in claim 39 wherein the third exclusion zone has a different shape than the first exclusion zone or the second exclusion zone.